

REMARKS

i) Claim Amendments

By the enclosed response, claim 1 is amended to incorporate various limitations of claim 5, and now recites the apparatus has including a plurality of electrodes which each comprise a folded or welded multipoint mesh sheet disposed in a plurality of substantially overlapping layers.

Claim 1 has been further amended to incorporate the Examiner's suggested wording at line 14.

Claim 5 has been amended to reflect the limitations introduced into base independent claim 1.

Claim 13 has been amended to incorporate various limitations of original claim 16, and now recites the invention whereby each electrode comprises a stainless steel mesh sheet which has been folded into at least three substantially overlapping layers. Claim 16 has been amended to reflect the limitations introduced into base claim 13.

Claim 19 has likewise been restricted to more narrowly recite the apparatus as including metal mesh electrodes which comprise a mesh sheet folded or spot welded into a plurality of substantially juxtaposed overlapping layers; and further recite the mesh electrodes as disposed in passage segments delineated by an electrical insulator; as for example was recited in applicant's original claim 21.

Claim 21 is amended to reflect the limitations introduced into base independent claim 19.

ii) Objection under 35 USC §112

It is believed that the restrictions to claim 1 and the amendment to incorporate the Examiner's suggested wording change are such that all of the Examiner's objections under 35 USC §112 are respectfully now traversed.

iii) Prior Art

With the aforementioned amendments, independent claims 1, 13 and 19 recite additional limitations respecting the configuration of the electrode in the claimed apparatus identified in applicant's original claims 5, 16 and/or 21.

By the 20 August 2010 Office Action, the Examiner has objected to original claim 5 as unpatentable in view of the combined teachings of United States Patent No. 5945072 to Terada, in view of United States Patent No. 5529760 to Burris, United States Patent No. 5411713 to Iwanaga, United States patent No. 6146599 to Ruan (the primary references respecting original claim 1), and in further view of United States Patent No. 5554345 to Kitchenman.

On page 6 (paragraph 8) of the Office Action, the Examiner attributes to Kitchenman as teaching subject matter of original dependent claim 5, concluding:

"Kitchenman teaches in an electrical discharge ozone generator the limitation (Fig. 10). The subject matter as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the references' teaching as shown by Kitchenman because the selection of any of known equivalent mesh sheets would have been within the level of ordinary skill in the art."

With respect, it is believed that Kitchenman neither alone, nor in combination with Terada, Burris, Iwanaga or Ruan teaches an apparatus for generating ozone having an electrode which comprises a folded or welded multipoint mesh sheet disposed in a plurality of substantially overlapping layers, as recited in amended claim 1, or for that matter, independent claims 13 and 19 as now presented herewith.

Kitchenman describes and illustrates in a first embodiment shown in Figures 2 to 4, a corona cell which incorporates a single layer titanium or stainless steel mesh 10 which forms part of the cell electrode 11 (column 3, lines 46 to 52). In the first described embodiment, the mesh 10 is shown as positioned within an air gap 9 defined by dielectric 8 and electrode plate 11. At column 4,

lines 15 to 33, Kitchenman describes the use of the mesh 10 as advantageously ensuring uniformity in the gap (9).

In Figures 5, 7 and 8 to 10, Kitchenman illustrates two alternate embodiments of an “electrically conductive structure” which may be used in substitution of the mesh 10 of Figure 3. As shown best in Figure 7, in the first alternate embodiment, the electrically conductive structure 17 is formed as an expanded metal “grid-type” structure which is described as including “loops 19” of electrically conductive material, which rise upwardly into contact with the dielectric material 8 (see column 5, lines 1 to 7). Again, the structure 17 is shown as having a single layer only.

With respect to Figure 10, Kitchenman describes the second alternate electrically conductive structure 19 as consisting of a “shaped or punched sheet of electrically conductive material, such as titanium or stainless steel forming a plurality of pyramidal shapes 20, the apexes 21 of which providing contact points for the structure 19 with the solid dielectric 8”, (see Kitchenman, column 5, lines 22 to 30).

Accordingly, the applicant most strenuously disagrees that Kitchenman in any way teaches or suggests an ozone generation apparatus which incorporates a mesh sheet electrode which is folded or welded into a plurality of substantially overlapping layers. Clearly, Kitchenman describes three different embodiments where the electrode is each formed as a single or unfolded “layer” only. Furthermore, as Kitchenman describes as an advantage the use of the mesh 10 in maintain uniformity of the spacing between dielectric 8 and electrode 11, it is believed there would be no motivation to modify the electrode of Kitchenman to adopt the applicant’s structure, absent the benefit of hindsight of the present disclosure.

It is furthermore believed that none of Terada, Burris, Iwanaga or Ruan are likewise of any assistance in leading one to the structure as now claimed. Like Kitchenman, Terada merely describes an ozonizer which incorporates a plate-like anode arrange between dielectric layers (see column 3, lines 6 to 11). Burris shows in Figure 2 a single-layer net or mesh 25 which is described as being formed of glass or ceramic strands 24,25 used to provide dielectric spacing (column 4, lines 33 top 44).

Neither Iwanaga nor Ruan are believed to provide any teachings which may be said to suggest the mesh electrode configuration as recited in the applicant's independent claims.

In contrast, the applicant has noted that the claimed apparatus provides various advantages which achieve enhanced ozone production efficiencies. The use of the claimed multilayer electrode advantageously assists in gas mixing within the fluid flow passage, providing more complete ozone production (see disclosure page 15, lines 25 to 28). In addition, the applicant has appreciated that light energy generated on both sides of multiple mesh layers will advantageously shine across the flow passage providing a higher activation level to the ozone, with more economical power use requirements. This in turn allows the operation of the claimed apparatus more efficiently and with lower heat build up.

It is generally understood that ozone can be quickly converted back to oxygen by thermal degradation. The corona generates heat, and in general the more power applied, the more heat is generated. Initially, applying more power increases the amount of ozone generated, but eventually a point is reached where the additional heat generated destroys the ozone faster than it is being created and the ozone output decreases. Increasing gas flow helps remove some excess heat. By adding additional layers of mesh, conversion efficiency is increased allowing a corresponding increase in gas flow.

Accordingly, it is believed that amended claim 1, and each of claims 3 to 4, 6 to 12 and 22 which ultimately depend therefrom, recite subject matter of patentable merit over the applied references.

The Examiner has also objected to the applicant's original independent claim 13 as obvious from Terada in view of Burris, Iwanaga, Ruan and in further combination of United States Patent No. 4790980 to Erni. In rejecting original dependent claim 16 under 35 USC §103(a), the Examiner relies on Terada as modified by Burris, Iwanaga, Ruan as applied to original claim 13, in further view of Kitchenman. As Erni likewise fails to teach or suggest any electrode configuration, let alone one which comprises a stainless steel mesh sheet which is folded into at least three substantially overlapping layers, for at least the aforesaid reasons, it is believed that applicant's

amended claim 13, and each of claims 17 and 18 which depend therefrom are patentable over the prior art of record.

Likewise, the Examiner has objected to applicant's original claims 19 to 24 under 35 USC §103(a) as obvious in view of Terada, Burris, Iwanaga, Ruan, Erni, Kitchenman and United States Patent No. 5492657 to Danschikov. Danschikov like the remaining Terada, Burris, Iwanaga, Ruan, Erni and Kitchenman references, fails to teach or suggest a metal mesh electrode which comprises a mesh sheet folded or spot welded in to a plurality of substantially juxtaposed overlapping layers, as is recited in amended claim 19 as now presented herewith:

Accordingly, it is believed that Danschikov either alone or in combination with the remaining references fails to teach or suggest the apparatus as recited in amended claim 19, or any of remaining claims 20, 21, 23 or 24 which depend therefrom.

In conclusion, it is respectfully submitted that with the amendments as now presented, each of claims 1 to 24 are now in condition of allowance.

If the Examiner is of the view that any additional defects remain in the claims as present, so as to preclude allowability, the Examiner is requested to telephone the undersigned at 1-416-961-5000, so that an interview may be arranged to expedite the allowance of the this case.

Favourable consideration is respectfully requested.

Respectfully submitted,

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GMT/tf